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PROPOSAL

MARYLAND SCHOOL BUS STUDY

February 1, 1971



PEAT, MARWICK, MITCHELL & Co.

CERTIFIED PUBLIC ACCOUNTANTS

FIRST NATIONAL BANK BUILDING

BALTIMORE, MD. 21202

February 1, 1971

The Honorable Marvin Mandel
Governor, State of Maryland
State House
Annapolis, Maryland 21404

Dear Sir:

Peat, Marwick, Mitchell & Co. is pleased to be among the Firms invited by your "Commission to Study School Pupil Transportation" to submit a proposal for accomplishing the objectives of the Committee. Members of our Firm have conferred with Mr. Fred H. Spigler, Jr. and we feel we have an appreciation for the problems the Committee is attempting to solve. This letter, therefore, confirms our understanding of the problems, summarizes the approach we will follow, and states the fee for our assistance.

OUR UNDERSTANDING
OF THE PROBLEM

Effectively solving public transportation problems is increasingly difficult as the level of services required continues to climb. Federal categorical programs tend to freeze existing systems and offer little incentive for experimentation. The possibility of establishing a united public transportation program which would serve the schools, the general public, as well as retirement homes, the handicapped and similar clientele has not received sufficient attention. Indeed, the question of the desirability of public or private ownership is not settled. || No

Controversy has arisen as to the most efficient and economical method for providing pupil transportation for almost a half million school children in Maryland. At issue is the question of public ownership and operation versus private ownership and operation of the school transportation system. Proponents of either side of the question have sought to have the issue solved by legislative mandate. The General Assembly, being reluctant to base action on conflicting testimony offered by the adversaries, requested the Governor of Maryland to have an independent impartial study undertaken of the subject of public versus private ownership and operation of school busses and the absolute cost of each system.



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Accordingly, Peat, Marwick, Mitchell & Co., having acquired a national reputation for performing economic analysis in both transportation and educational systems, was asked by the "Governor's Commission to Study School Pupil Transportation" how we might assist the Commission in this significant study.

OBJECTIVES AND SCOPE

The objectives of the study are as follows:

- . A measure of the absolute cost, direct and indirect,
attributable to private ownership and public ownership of
pupil transportation equipment and facilities in Balti-
more City and other selected county subdivisions in
Maryland.
- . An analysis of the basis for establishing the level of
pupil transportation services in each subdivision studied.
- . An assessment of the adequacy of the state formula for
reimbursing transportation costs.
- . An analysis of the effect of unique transportation programs,
i.e., field trips, vocational education, handicapped
children, etc., on the cost of transportation.

It is our understanding that the Commission wishes the study completed on or before July 1, 1971.

HOW WE WILL PROCEED

The limited resources at the disposal of the Committee required a well organized approach to the engagement if the objectives of the study are to be met. We set forth in the following sections of this letter our approach to the study.

(a) Cost Study

In order to accurately assess the cost of pupil transportation in the selected districts, the consulting team will visit each selected district to accumulate and validate total direct and indirect costs incurred by private and public school transportation systems. Costs examined will include but not be limited to:



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- . personnel cost including fringe benefits, substitute pay, inservice training, personnel administration, etc.;
- . facilities cost including building depreciation and/or bond redemption schedules, parking lots, utilities, etc.;
- . equipment cost including busses, maintenance equipment, auxiliary vehicles, etc.;
- . administrative overhead cost including office furniture and equipment, office space, office supplies, legal fees, etc.;
- . fleet operating cost including gasoline, tires, grease, batteries, etc.;
- . the impact the shift in tax burden would have on the cost of public ownership; and
- . other such factors the Commission staff may suggest.

The successful completion of the cost study will require the complete cooperation of all public agencies involved as well as those private contractors who do business within the divisions selected for the study.

(b) Basis for Pupil Transportation

The consulting team will analyze the assumptions and practices used as the basis for the level of transportation services in each subdivision. Comparisons will be made as to policy between these subdivisions and other subdivisions within Maryland as well as subdivisions within other states. *rw*

Recommendations will be made on standardization of levels of service applicable to all subdivisions.

(c) State Reimbursement Formula

An analysis of the present pupil transportation reimbursement formula will be made to determine its adequacy for equitably underwriting transportation costs for Maryland's school children. Appropriate recommendations will be made which take into consideration such factors as:

- . sparsity and density;
- . the extent to which the formula is responsive to inflationary or deflationary pressures, i.e., its regenerative qualities;



TASK ELEMENT	MARCH	APRIL	MAY	JUNE
COST ANALYSIS				
1. Orientation with Committee Staff				
2. Define Data Elements and Design Collection Procedures				
3. Test in One District				
4. Revise and/or Modify				
5. Collect Data				
6. Analyze Data Collected				
7. Write Report				
REIMBURSEMENT FORMULA				
1. Analysis of Existing Formula				
2. Analysis of Other Formulas				
3. Assessment of Existing Formulas Impact on Study Districts				
4. Develop Recommendations Based on Findings				
5. Write Report				
BASIS FOR LEVEL OF SERVICE				
1. Comparison of Basis Between Study Districts				
2. Analysis of Basis Used by Other Maryland Districts				
3. Survey of Selected Districts in Other States				
4. Develop Recommendations for Basis for Level of Service				
5. Write Report				
MEETINGS WITH CLIENT				

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- . the extent to which the formula penalizes inefficiency;
- . the computational ease with which the formula may be applied, i.e., can it be computer based;
- . provision for equipment depreciation; and
- . applicability to all Maryland subdivisions. — No

(d) Unique Transportation

Certain transportation programs, such as handicapped pupils, field trips, transportation for vocational education, and the like, vary in their impact on the different subdivisions. Every effort will be made to keep such costs separate for comparison purposes. It is understood, however, that in the absence of sufficient records to use as a basis for accumulating absolute costs, standard proration methods will be used.

Further, the resource restraints of the project prevent a detailed audit of records of the public and private agencies involved. We will, however, examine methods of attributing costs and make every effort to discover and reallocate costs improperly attributed.

TIME SCHEDULES
AND REPORTS

Our Firm would meet the time constraints outlined in the Request for Proposal based upon a contract award on or about February 15, 1971. The mechanics of our work program, illustrated on the facing page are:

(a) Cost Analysis

- . Initial conference with Committee staff to define data elements for cost analysis study and set general parameters of the study.
- . Test data elements in first district.
- . Revise and modify collection procedures, if necessary.
- . Proceed with data collection in other districts.
- . Analyze data collected, ascertain effect of special transportation programs.
- . Report conclusions.



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At the same time this process is being undertaken initial inquiry into the two other elements of the study, the adequacy of the formula and the basis for the level of services offered would be undertaken as follows:

(b) Reimbursement Formula Adequacy

- . Analysis of the existing formula.
- . Analysis of other formulas.
- . Assessment of the existing formulas impact on study districts.
- . Develop recommendations based on findings.
- . Write report.

(c) Basis for Level of Service

- . Comparisons of basis between study districts.
- . Analysis of basis used by other districts within Maryland.
- . Survey selected districts throughout the country.
- . Develop recommendation of basis for establishing levels of service for Maryland.
- . Write report.

Suggested approximate dates for conferences and reports with the Committee staff and the Committee are indicated by symbol.

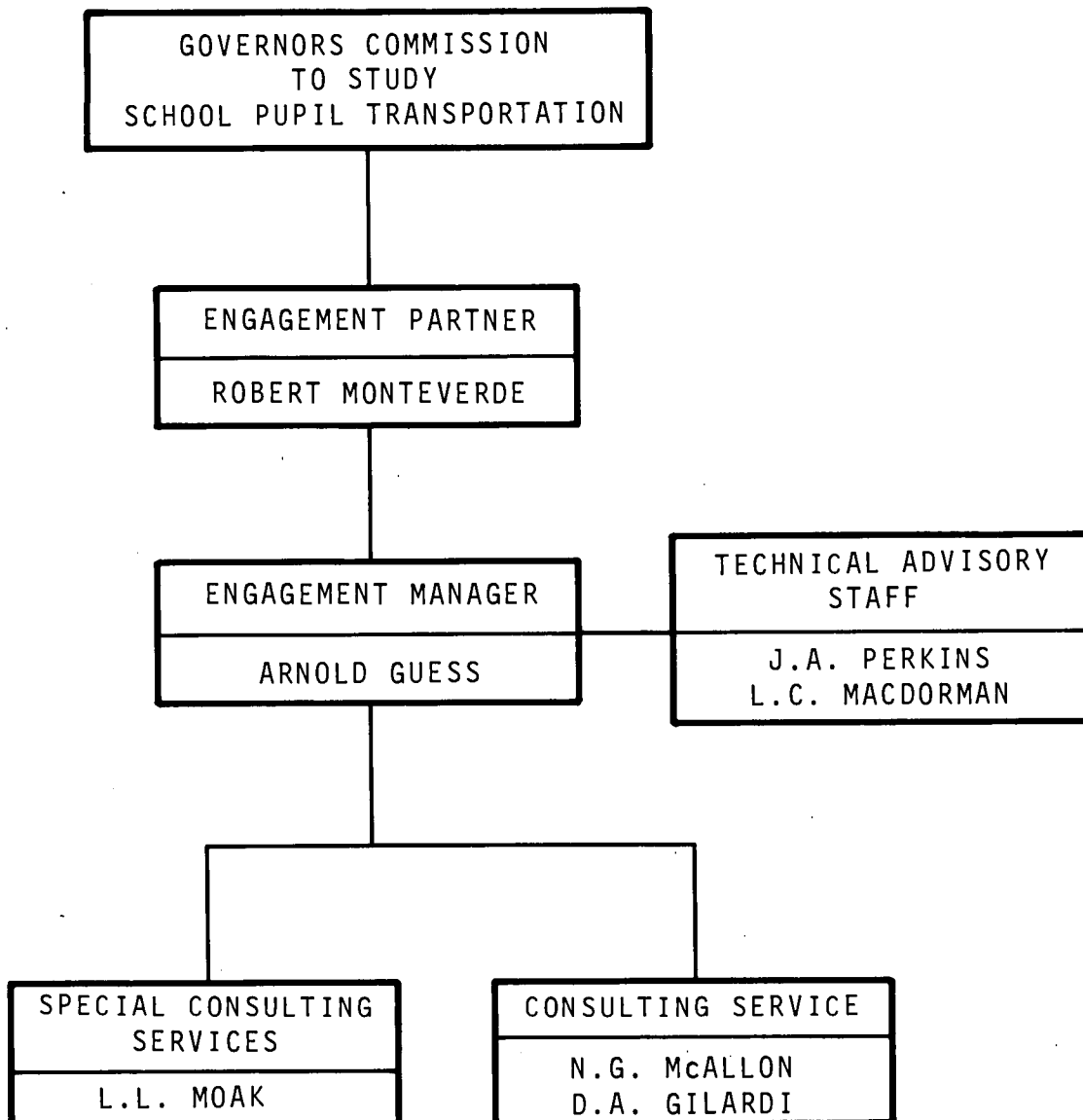
OUR QUALIFICATIONS

Peat, Marwick, Mitchell & Co. has had wide experience in conducting studies of transportation systems, local education agencies, state educational agencies, and making economic analyses.

We have recently completed a study in Nova Scotia wherein we used a computer-based transportation model to predict optimum routing, scheduling, and pick-up points. The result of the study was a twenty percent reduction in the school bus fleet.



ORGANIZATION AND STAFFING



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While this request for proposal envisions in part an analysis of total costs between two methods of operation, we have developed formulas for measuring efficiency in terms of cost between dissimilar districts in the state of New York. Your attention is invited to the attached article, "Scientific Technique for Improving School Management Effectiveness", by Harold I. Steinberg, PMM&Co.

Finally, we direct your attention to Exhibit A attached which summarizes a few of our engagements.

ORGANIZATION AND STAFFING

Personnel skills and the organization required for successful completion of the engagement are illustrated on the facing page and described below.

As partner-in-charge of the engagement, my overall responsibilities for the engagement will be responsibility for its timely completion, technical results, and coordination of the work of the participants.

The primary role and skills as well as level of participation on the other personnel assigned will be as follows:

Project Management (15%) Mr. Arnold Guess, a member of our national practice staff, will have day-to-day management responsibility for project direction, coordination, and progress reports.

Technical Advisory Services (15%) Mr. Joseph A. Perkins, national practice director for elementary and secondary education, and Mr. Littleton C. MacDorman, Washington partner specializing in traffic research and transportation planning will act in a project advisory role. Both these men are widely experienced in consulting and have managed engagements of national significance.

Special Consultant Services (10%) Mr. Lennox L. Moak will provide special consulting to the project. He is widely recognized in financial administration and has conducted a number of studies of school transportation problems in Pennsylvania.

Consultant Services (60%) Mr. Donald Gilardi and Mr. Neil McAloon will provide consulting services to the engagement. Both of these men have worked on a wide range of engagements and will bring valuable experience to the engagement.

Attached are brief resumes of staff members who would be assigned to the project.

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FEE

It is our normal practice to bill clients at our standard rates for our various personnel extended by the time devoted to an engagement. Additionally, we are reimbursed for out-of-pocket expense such as travel, per diem, report production and the like.

Frequently we are called upon to submit a "not to exceed" price in connection with governmental agencies. Therefore, we propose to complete the work program outlined in this letter at a total cost, fee and expenses, not to exceed twenty-five thousand dollars (\$25,000).

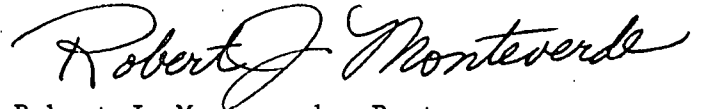
It is our practice to render monthly progress bills based upon the work completed to date.

* * * * *

We look forward to working with you on this most significant engagement.

Very truly yours,

PEAT, MARWICK, MITCHELL & CO.



Robert J. Monteverde, Partner

RJM:jlw

Enc.

EXHIBIT A - SUMMARY OF ENGAGEMENTS

PEAT, MARWICK, MITCHELL & CO. QUALIFICATIONS

Peat, Marwick, Mitchell & Co. is a large expanding firm of certified public accountants and management consultants. The firm, founded in the city of New York in 1897, now serves its clients through 300 offices on six continents. In the United States the firm employs over 12,000 professionals in its accounting and management consulting staff.

Peat, Marwick, Mitchell & Co.'s management consulting group consists of over 1,000 consultants who devote full time to this activity.

In the transportation industry Peat, Marwick, Mitchell & Co.'s consulting practice is one of the most extensive of any in the world. In the last ten years, the firm has conducted consulting engagements involving over 400 man-years of consulting time for a variety of transportation companies, government agencies, and industrial concerns. These studies have covered nearly all aspects of the transportation of passengers and freight including marketing research, terminal and inter-terminal operations, materials handling, facilities requirements, maintenance practices, industrial engineering, clerical work measurement, design of management information system, responsibility reporting, computer feasibility and systems design, computer simulation, as well as overall general management and organization studies. A partial list of organizations for whom we have conducted transportation consulting engagements is included.

Of particular interest is a study, now completed, concerning the financing of the proposed Baltimore Rapid Transit System. Peat, Marwick, Mitchell & Co. was retained by the Regional Planning Council of Baltimore to provide a factual basis and analytic approach for decisions the Council must make regarding the financing and organization of Baltimore's proposed rapid transit system. The essential parts of this study consisted of an analysis of sources of financial support to meet projected capital requirements and an evaluation of alternative funding possibilities and fiscal impact.

Your attention is invited to the engagements listed below which indicate the scope of our transportation consulting practice.

City of Baltimore, Maryland

A comprehensive evaluation of the total traffic signal system within the confines of the City of Baltimore was undertaken by PMM&Co. This study has as its goals the following:

- . evaluation of existing traffic conditions;
- . analysis of proposed street network and forecasts of traffic conditions as related to the signal system;



- . identification of those criteria a Baltimore signal system should be sensitive to;
- . evaluation of existing system relative to established criteria;
- . identification and evaluation of possible alternate control systems, including digital computer controlled systems; and
- . preparation of recommendations regarding a practical course of action to provide the most effective and efficient traffic control system.

School Bus Requirements Study, Province of New Brunswick

The consolidation of many of New Brunswick's school districts and the closing of a number of smaller schools in the rural areas made major revisions in the various district transportation systems necessary. Kates, Peat, Marwick, PMM&Co.'s Canadian affiliate, was retained to review the proposed new routings of each district and to determine:

- . that a feasible plan for each district has been formulated;
- . that enough vehicles were available;
- . whether methods could be devised to economically improve the efficiency of the school bus operations.

Questionnaires were distributed to each school district to aid in the definition of standards and the extent of services to be provided within each district.

Northeast Corridor Transportation Project, Office of High Speed Ground Transportation

PMM&Co. provided consulting services for nearly three years to the Northeast Corridor Transportation Project. During this time, the following studies were conducted or are in a continuing phase of operation:

- . development and application of a travel demand model capable of estimating future intercity travel. Estimation is based on demographic and economic area characteristics, as well as on factors describing the impedance to travel propensity;
- . development and calibration of a discriminant function-modal split model for intercity travel;
- . development of automated method for changing parametric values associated with multi-modal transport networks;

- . development and application of an access model capable of forecasting travel impedances to new system terminals. This model provides the user with reasonably accurate values, without the involvement of traditional network techniques;
- . collection and compilation, from primary and secondary sources, of information necessary to produce coded network descriptions of all major highways, railways, bus lines, and airline facilities to forecast and simulate future travel demands. Inventories and summaries were made of transportation facility capacities, travel times, and travel costs under peak and off-peak conditions separated by mode. For common carriers, an inventory of operating schedules was compiled, a task that involved analysis of all schedules and elimination of overlaps. PMM&Co. mapped and coded existing and proposed commodity networks for the years 1965, 1970, and 1975 in terms of rail shipments, pipelines, coastal shipping, and electrical transmission lines, and also developed back-dated travel-impedance matrices for auto, rail, bus, and air travel. The recording of longitude and latitude coordinates for all modes enables machine plotting of travel data;
- . development of information describing highway maintenance costs, automobile driving costs, and intercity bus company revenues and expenses for the Northeast Corridor region;
- . preparation of a report describing the impact of near-term improvements by planning agencies and operators. This on-going task will include an analysis of network deficiencies and under utilization and recommendations for improvements to the transport systems;
- . development of a technique for rapidly calculating the cost of commodity and freight movement, by rail or motor freight, between city pairs;
- . determination and evaluation of the existing and near term status of intercity transportation in the Northeast Corridor with emphasis on the movement of passengers is being undertaken. The data presented in the evaluation will be a tool for more detailed review of the present status of all elements of the total system, and of the development plans of the various transportation agencies and commercial enterprises of the Region, to project the expected status of the transportation system as a result of currently programmed improvements. An assessment of existing and anticipated problem areas will be made. The study will result in the development of a Northeast Corridor Transportation Fact Book and a report indicating current and developing deficiencies in the Corridor Transportation system.

PARTIAL LISTING OF EDUCATIONAL INSTITUTIONS
MANAGEMENT CONSULTING PROJECTS

The firm has performed a wide range of consulting engagements for state departments of education, local school districts, colleges and universities. Examples of school districts where we have conducted management reviews and operations analysis of transportation systems are:

- . Houston, Texas
- . Middletown, Ohio
- . Erie, Pennsylvania
- . Knoxville, Tennessee
- . Caddo Parish, Louisiana
- . Manatee County, Florida.

Some examples of recent engagements of PMM&Co. in the educational field which reflect our qualifications and experience are summarized below.

Local School Districts

Parma City, School District, Parma, Ohio

The Firm recently completed a comprehensive financial and operations review of the Parma City School District. The four-part study consisted of:

- . an operations analysis of the practices and procedures of the school district;
- . a study comparing Parma with similar school districts in the U.S.;
- . suggested compensation plans; and
- . an evaluation of the existing financial situation.

In addition to providing an 86 page report, the Firm presented its findings and recommendations during a three-hour presentation before 1,000 interested citizens.

Spring Valley, New York

The firm assisted the Ramapo School District #2 (enrollment - 16,000) and Pearl River School District (enrollment - 3,700) in implementing a PPB system. This engagement, called the Spring Valley Project, is a pilot effort being funded by the New York State Department of Education.

Manatee County School District, Bradenton, Florida

PMM&Co. was retained by the Manatee County Board of Public Instruction to review existing accounting procedures and business practices, in addition to designing a computer-oriented accounting system. One of the primary criteria in our design of the financial accounting procedures was to provide sufficient flexibility so that the subsystem would be adaptable to the needs of the other subsystems. Most of the Firm's recommendations have now been implemented successfully.

Erie, Pennsylvania School District

PMM&Co. recently completed an engagement for the Erie School Board to conduct a comprehensive study of the district. Among the items were:

- . a facilities survey, which required meeting regulations of the Pennsylvania Human Rights Commission on pupil distribution;
- . development of a professional negotiations policy for the Board;
- . an operations analysis of the administration of the district;
- . an assessment of teacher morale; and
- . other elements of work.

Caddo Parish School System, Shreveport, Louisiana

PMM&Co. participated in a joint study of the entire educational effort of this system with George Peabody College of Education. An operations analysis of all administrative and auxiliary functions and the analysis of the financial accounting system were performed in relation to the stated program objectives of the school system.

San Diego School System, California

PMM&Co. recently completed a series of projects assisting the San Diego system in reorganizing its financial and physical plant management to assist the school system in meeting its defined objectives. It is currently assisting them in implementation of a PPB system as one of the California pilot districts.

Cook County Schools, Illinois

We have conducted a series of PPBS implementation seminars for the Cook County Schools as a prelude to full implementation of the system.

New York City Board of Education

We were retained by the Board to design the system for collecting and reporting on student enrollment and attendance in the City's public and private schools (approximately 1,600,000 pupils). The system, when implemented, will allow the Board to properly claim its state and federal financial aid (it was losing \$30-35 million per year because of underreporting), and the system provides current information on which to base teacher assignments and work-load scheduling. We are continuing to assist the Board in the design of and assistance in the implementation of a decentralized Community District financial accounting system.

Dearborn Public Schools, Michigan

PMM&Co. assisted the Dearborn Public Schools in developing a Master Plan for the utilization of a computer, along with other audio/visual media in the instructional administrative programs of both the K-12 program and the Edsel Ford Community College.



California Advisory Commission on School Budgeting and Accounting

PMM&Co. is presently engaged in a pilot project designing and implementing PPBS in nineteen California school districts. The system as ultimately designed will be adopted by all of California's local school districts.

Additional Local School Districts

- . Albuquerque (New Mexico) Public Schools
- . Ames (Iowa) Community School District
- . Beaver County (Utah) School District
- . Cedar Rapids Community School District of Linn County (Iowa)
- . Cincinnati (Ohio) Public Schools
- . David County (Utah) School District
- . Des Moines (Iowa) Independent School District
- . El Paso (Texas) Independent School District
- . Grants (New Mexico) Public Schools
- . Granite (Utah) School District
- . Kanai Peninsula Borough (Alaska) School District
- . Lincoln (Nebraska) Public Schools
- . Los Altos (California) School District
- . Los Angeles (California) City Schools
- . Los Gatos (California) City Schools
- . Midland (Texas) Independent School District
- . North Polk (Iowa) Enlarged Community School District
- . North Sanpete (Utah) School District
- . Omaha (Nebraska) Public Schools
- . Perrysburg (Ohio) School District
- . Philadelphia (Pa.) School System, in cooperation with Pa. Economy League, Inc.
- . Rowland (California) School District
- . Salt Lake City (Utah) School District
- . San Diego (California) Unified School District
- . Saydel (Iowa) Consolidated School District
- . Seattle City (Washington) School District
- . South Sanpete (Utah) School District
- . Vallejo Unified (California) School District
- . Youngstown (Ohio) School District
- . Ysleta (Texas) Independent School District

State Departments of Education

Pennsylvania Department of Education

We have completed the design of a long-range master plan for a management information system based on a five-year time frame. This system was designed to provide the required input for a PPBS. Rather than looking only at the existing and proposed information needs in terms of specific data elements or combinations, we constructed an analytical decision model. We are continuing to work on the various subsystems under the educational management information system master plan.

North Carolina Department of Education

We have completed a project to plan and design an educational management information system. This agency includes the Department of Public Instruction, the Division of Community Colleges, and the Controller's Department. This system is also based on the fulfillment of the information needs as inputs for a future PPBS.

California Department of Education

PMM&Co. has completed a project to design a methodology to evaluate the effective use of textbooks printed and distributed to local districts.

Georgia State Department of Education

We have completed for the Georgia Department of Education the design of the responsibility accounting reports and reviewed the departmental budget development and controls. We assisted them in adapting the reporting and control procedures to the Department's electronic data processing equipment.

Rhode Island Department of Education

We have completed a comprehensive analysis of the Department's management effectiveness including a review and summary of existing organization and mission as set forth by statutory mandates and limitations. We are currently assisting in the implementation of our recommendations.

Alabama Department of Education

The Firm was engaged by the Department of Education to develop and implement a coordinated educational management information system for the Alabama Department of Education. It included a comprehensive financial accounting and budget management system designed to make optimum use of third generation computer hardware. To minimize duplication, fragmentation and other inefficiencies in existing information flows, the study involved a detailed analysis of all collecting, processing, and reporting forms and techniques. The firm assisted the Department in implementation of the financial accounting subsystem.

New York Department of Education

We have completed a project for the Department to develop mathematical formulas to assist local school officials in evaluating the operating effectiveness of various auxiliary school services. The concept of these analytical formulas can be replacated for any other state department of education.

Iowa Department of Public Instruction

We conducted a series of four seminars for all professional departmental personnel in the concepts and practices of management by objectives and PPBS. These seminars are a prelude to the Department's objective to implement PPBS as a part of the Governor's master plan for all state agencies.

Puerto Rico Department of Education

We completed a program cost accounting system to provide the Commonwealth with the ability to move to program planning and budgeting. This is the first educational financial accounting system which provides for capital asset depreciation.

We are currently engaged in designing and supervising the implementation of an instructional media warehousing system to be integrated with new Title I and Title III ESA programs.

Maryland Higher Education Coordinating Council

We completed the design and test of a statewide demand simulation model for predicting higher education facility and other resource needs over a twelve-year time frame.

Mississippi Department of Education

We completed a comprehensive study of the Department's organizational structure, administrative practices and procedures, and redesigned the financial management system in anticipation of the ultimate use of PPBS. We are currently assisting in the implementation of our recommendations.

Texas Education Agency

We have completed for the Texas Education Agency a plan for an educational management information system and the development and implementation of a budgetary and accounting system for local school districts. The accounting system encompasses current philosophy on program cost accounting which will be useful to the local educational decision-makers. It was also being designed to interface into the overall management information system and its subsystems. The accounting system was conceptualized, designed, computer-programmed and implemented in a limited number of Texas school districts in the 1969-70 school year.

Additional State Department of Education and Related Departments

- . Alaska State Department of Education
- . California Teachers' Retirement System
- . Connecticut Higher Education Commission
- . Florida Commission on Quality Education
- . Illinois State Scholarship Commission
- . Illinois State Teachers' Retirement System
- . New York State Teachers' Retirement System
- . Wisconsin Higher Education Facilities Commission

U.S. Office of Education

We are currently engaged by the Office to design and supervise the implementation of a financial management system for all the federal programs as well as the internal operations of the agency. This system will meet the PPBS regulations now required of all federal agencies by Executive order.

We developed the guidelines and designed the system for conducting a "National School Facilities Survey."

The Firm has recently completed the revision of the U.S. Office of Education's authoritative publication, "Financial Accounting for Local and State School Systems, Handbook II." It is planned that this chart of accounts, standard terminology and definitions, will be implemented by all states after a series of regional information conferences which are now in progress.

EXHIBIT B - RESUMES



ROBERT J. MONTEVERDE

Mr. Robert J. Monteverde is partner-in-charge of the Firm's northeastern region governmental consulting practice in the Philadelphia office. He has had 17 years of experience in consulting in a wide variety of fields with a major emphasis on systems, accounting and tax related studies. His principal engagements which are pertinent to this study are:

- Pennsylvania Department of Education. Responsible for study to develop a five year master plan for the design and implementation of an educational management information system.
- Puerto Rico Department of Education. Project manager on a study to develop the first totally integrated state/local educational cost accounting and financial control system in the United States.
- Maryland Advisory Council for Higher Education. Project manager on study to develop, program and implement a comprehensive higher education facilities planning system for institutions within the State.
- Regional Planning Council of Baltimore. Project manager of a study intended to lead to the formulation of legislation to authorize the construction of a rapid transit system. The study investigated sources of financing, the relative contributions of each feasible source, and the socio-economic effects of drawing on these sources on the immediate and adjacent regions affected by the proposed project.
- U.S. Department of Transportation. Project manager of study to develop fully allocated costs of rail passenger service between New York and Washington, D.C.
- Florida Commission for Tax Reform. Was a member of the study team that reviewed current legislation and taxing practices and developed new approaches to eliminate inequities, improve assessment and collecting procedures, enhance yield and generally streamline the State's existing taxation structure.
- Mississippi State Highway Department. Project manager on a study to design, develop and implement a comprehensive financial management and cost accounting system, and a personnel classification and merit system.
- Pennsylvania Liquor Control Board. Project manager of a comprehensive study to design and implement a total management information system.

Some other representative governmental assignments which Mr. Monteverde has accomplished include:

- Board of Education (Philadelphia). Review of treasury and pre-audit functions.
- U.S. Post Office Department. Design, develop and test a statistically valid sample to estimate mail revenues and volumes, by class.
- Air Material Command. Analysis of logistics support program, through man-machine simulations, with The RAND Corporation.
- National Aeronautics and Space Administration. Design and implement financial management system for Langley Research Center.
- Alabama Highway Department. Responsible for project to design and install a complete computer-oriented financial management information and control system.
- Pennsylvania Priorities Commission. Served as Co-Chairman by appointment of Governor Shafer.
- Blue Ribbon Defense Panel. Served on U.S. Navy Subcommittee of AICPA Advisory Committee.

Mr. Monteverde holds degrees of BS and MS in industrial administration from Carnegie Institute of Technology. He is a Certified Public Accountant and is an active member of several professional organizations including The Institute of Management Sciences and Operations Research Society of America.

JOSEPH A. PERKINS, JR.

Mr. Perkins is a principal in the management consulting department of Peat, Marwick, Mitchell & Co. He is responsible for directing the firm's services to public and nonpublic elementary and secondary school systems at the local, state, and federal levels. He provides consultation to PMM&Co. study teams that are reviewing, designing, or installing various management systems and services wherever the firm has consulting engagements for such clients in the United States.

Mr. Perkins has been responsible for the direction of such projects as:

- . designing, testing, and implementing the Planning, Programming, and Budgeting System (PPBS) for the public school system in California;
- . management studies of such school systems as Dearborn, Michigan, Knoxville, Tennessee, Erie, Pennsylvania, Shreveport, Louisiana, New York, New York, Manatee County, Florida, Broward County, Florida, Houston, Texas, and Youngstown, Ohio;
- . organization and management studies of state departments of education such as Mississippi, Rhode Island, and North Carolina;
- . designing management information systems for state departments of education such as Pennsylvania, Alabama, North Carolina, Puerto Rico, Mississippi, and Georgia;
- . revising the U.S. Office of Education Handbook II, FINANCIAL ACCOUNTING, Classifications and Coding for Local and State School Systems;
- . directing a number of seminars on PPBS, management by objectives, and program accountability for such groups as the Lincoln, Nebraska, public schools, Iowa Department of Education, and School Management Institute; and
- . a study of the controllership of the New York Archdiocese School System and a separate study of the long-range financial needs of New York nonpublic schools.

Prior to joining PMM&Co., Mr. Perkins was with the U.S. Office of Education as a management specialist assisting local and state school systems. Most recently there, he was Director of the College Facilities Loan Program.



Mr. Perkins has been a teacher in both public and private schools; business manager of a large public school system in Pennsylvania; special consultant to the Pennsylvania Department of Education in the areas of school accounting systems, facilities planning, insurance, statistics, and data processing; and business manager for the Pennsylvania State University, Southeastern Commonwealth Campuses.

Mr. Perkins was chairman of the National Public School Accounting Committee appointed by the U.S. Commissioner of Education; co-author of the book Principles of Public School Accounting; and author of various articles in professional journals on educational administration. Mr. Perkins is an active member in various professional organizations, including the American Association of School Administrators, the Association for Education Data Systems, and the Association of School Business Officials of the United States and Canada.

Mr. Perkins received the degrees of Bachelor of Science from Virginia Military Institute and Master of Education in School Business Management from Temple University, and has taken doctoral courses in educational management at Columbia University.

LITTLETON C. MACDORMAN

Mr. MacDorman is principal in charge of transportation planning and traffic engineering for Peat, Marwick, Mitchell & Co.'s (PMM&Co.) Washington, D.C., office. In this capacity, he has been responsible for a variety of studies and engagements, some of which are summarized below:

- . analysis and evaluation of bus transit systems in urban areas;
- . travel demand surveys, inventories, and comprehensive transportation planning for major urban areas;
- . design and calibration of activity allocation models which describe future land-use patterns as a function of developmental policies;
- . development of simulation networks, determination of passenger and freight impedances, design of travel surveys, assessment of present plans and policies, forecast of access characteristics to common carrier terminals, and analysis of the location and functions of terminal systems for intercity travel;
- . development of operational computer programs for transportation planning;
- . development of advanced techniques to assist in the evaluation of urban parking programs;
- . development of an action program and implementation of plans and procedures to improve access to major airport facilities;
- . economic feasibility study of an industrial airpark; and
- . traffic operations improvements which increase the capacity and safety of roadways in urban areas.

Prior to joining PMM&Co., Mr. MacDorman was employed as a Highway Research Engineer with the District of Columbia Department of Highways and Traffic, where he was head of the Analysis Unit for the Washington Metropolitan Area Transportation Study. His responsibilities included the analysis of travel volumes for location and design, the economic and statistical evaluation of transportation systems, and the development of feedback techniques for travel modes. Mr. MacDorman provided services to both the Maryland State Roads Commission and the Virginia Department of Highways.



Earlier, as a designer for Whitman, Requardt and Associates in Baltimore, Maryland, Mr. MacDorman was involved in the design of numerous highway and airfield projects, including such facilities as the Baltimore Harbor Tunnel and Andrews Air Force Base, Maryland. His duties included alignment and grade determination, geometric layout for interchanges and channelized intersections, cost estimates, and pavement design.

Mr. MacDorman also was employed by Buchart Engineering for the design of highway facilities in Pennsylvania, Indiana, and West Virginia. As an associate engineer for Buchart, Mr. MacDorman was responsible for the preparation of various location and traffic studies undertaken by the firm. In this capacity, he made analyses for alignment, grade, interchange type, and spacing justification. Cost estimates and economy studies were prepared for reports to the Pennsylvania Turnpike Commission, the Pennsylvania Department of Highways, and the West Virginia State Road Commission.

Mr. MacDorman received the degrees of Bachelor of Science in civil engineering from the University of Maryland and Master of Civil Engineering from the Catholic University of America.

Mr. MacDorman is a registered Professional Engineer in nine states and the District of Columbia. He holds membership in the American Society of Civil Engineers, the Highway Research Board, and the American Society of Planning Officials. Mr. MacDorman is a member of several technical committees of the Highway Research Board and the Institute of Traffic Engineers. He is the author of publications on the subject of system and network capacity, the sensitivity of highway economic factors, and pedestrian travel characteristics.



ARNOLD F. GUESS

Mr. Guess is a manager in the management consulting department of Peat, Marwick, Mitchell & Co. He is responsible for assisting in the firm's services to public and non-public elementary and secondary school systems at local, state, and federal levels. He provides consultation to PMM&Co. study teams which are reviewing, designing, or installing various management systems or services wherever the firm has consulting engagements for such clients in the United States.

Mr. Guess has participated in or managed such projects as:

- management analysis, long-range facilities plan, pupil distribution plan, curriculum analysis, and negotiations plan for the Erie, Pennsylvania, public schools;
- management analysis, design, and implementation of a computerized financial system for Middletown, Ohio, public schools;
- management analysis and/or salary/wage studies of school systems in Knoxville, Tennessee; Houston, Texas; Cincinnati, Ohio; and Youngstown, Ohio;
- PPBS and management by objective seminars for the School Management Institute, the Iowa School Boards Association, and Cook County, Illinois, Schools; and
- design implementation of a financial accounting system for the Alabama Department of Education.

Prior to joining the firm, Mr. Guess served in the Kentucky Department of Education as Field Supervisor in the Division of Buildings and Grounds, Assistant Director of the Division of Statistical Services, Director of the Division of Computer Services and Director of Statistical Services. During his professional career, he served in local systems as a high school teacher, an elementary principal, a high school principal, and a county superintendent.

Mr. Guess served as chairman of a number of significant committees including the Statewide Pupil Accounting Project and the School Administrators' Improvement Committee. Nationally, he was active in organizing the Association for Educational Data Systems and the Chief State School Officers Committee for Educational Systems.



Mr. Guess received both the Bachelor of Arts and the Master of Arts degrees from Western Kentucky University. He has done additional work toward his Doctorate there and at the University of Kentucky.

LENNOX L. MOAK

Mr. Lennox L. Moak is a special consultant to Peat, Marwick, Mitchell & Co. in engagements relating to public financial administration and problems. He is widely recognized in financial administration, and presently is Director, Pennsylvania Economy League, Inc. (Eastern Division). For more than a decade he has been Research Consultant to the Municipal Finance Officers Association. Among his other positions in public administration have been:

- . Budget Officer, State of Louisiana, 1940.
- . Director of Finance, City of Philadelphia, 1952-54.

Through the years, Mr. Moak has assisted numerous local governments in the United States, Canada and Italy in improving various facets of their financial administration. Among the governments to which he has served as consultant in one or more aspects of financial administration are:

- . Philadelphia Board of Education;
- . City of Philadelphia;
- . New Orleans;
- . Wilmington, Delaware;
- . Rome, Italy;
- . Newark, New Jersey;
- . Toronto, Ontario;
- . City of New York;
- . Florida Commission for Tax Reform;
- . Baltimore Regional Planning Commission;
- . State of Louisiana; and
- . State of New Jersey.

The Pennsylvania Economy League, under his direction, has undertaken a number of studies of Pennsylvania school districts, including school busing operations and financing within the five southeastern Pennsylvania counties.

Mr. Moak is a lecturer, Graduate Public Finance Program, Wharton School, University of Pennsylvania, and has lectured on related subjects in a number of other universities. He has authored many books, monographs and articles in the field of public finance, including the leading authoritative work on Local Sales Tax Administration published by the Municipal Finance Officers Association in 1961.

As Director of Finance for the City of Philadelphia, he had the responsibility for organization of the first integrated pattern of financial administration ever present in that city--revenue, including the local income tax; procurement; accounting; treasury management; capital budgeting; capital programming; fiscal policy development and execution including the operating budget process; pension administration, and capital financing.



He holds a BS degree from Southwest Texas State College and an MA degree in public administration from the University of Texas.



DONALD A. GILARDI

Mr. Donald A. Gilardi is a consultant with the Philadelphia office of PMM&Co. He joined the Firm in the Fall of 1964 and was initially assigned to the audit staff. Prior to his transfer to the consulting staff in 1969, he was a supervising senior accountant.

In addition to commercial engagements, Mr. Gilardi participated in numerous audits of medical and educational institutions.

Major engagements of a non-profit nature are as follows:

- . Children's Hospital of Philadelphia. Reviewed financial and statistical records and developed patient cost per diem rate.
- . Hahnemann Hospital. Reviewed financial and statistical records for adequacy and assisted in the preparation of their initial Medicare report.
- . Center City Hospital. Designed and implemented an accounting and management reporting system.
- . Nazareth Hospital. Assisted in a systems study of the outpatient department.
- . Johnson C. Smith University. Assisted in the preparation of cash flow projections for a fiscal year.
- . St. Joseph's College - Academy of Food Marketing. Reviewed internal financial management and reporting systems.
- . University of Delaware. Assisted in the design of an accounting and management information system.
- . Union Memorial Hospital. Prepared a financial feasibility study for the construction of a new hospital.
- . St. Paul's College. Assisted in the development of programs for long-range planning and budgeting, in addition to designing and implementing an accounting and management information system.
- . Society of the Holy Child Jesus - Rosemont Province. Designed and implemented an accounting and management information system for the administration and all Convents of the Province. Assisting in the modification of accounting systems for schools owned by the Province. Currently acting as Chairman of the Finance Committee of Rosemont Province.



Mr. Gilardi previously served in the Medical Service Corps of the U.S. Army. An officer, his administrative assignments included supply and patient evacuation.

Mr. Gilardi holds a degree of Bachelor of Business Administration in accounting from the University of Wisconsin. He is a Certified Public Accountant in Pennsylvania.

NEIL J. McALOON

Mr. Neil J. McAloon is a consultant on the Firm's Philadelphia staff. Typical contracts in which he has worked include:

- . State of Illinois. Participation in the design and implementation of a system for collecting, recording, and administering state taxes.
- . Commonwealth of Pennsylvania. Conducted a systems study and operational audit of certain facets of the State's Welfare Department. He was also a member of a study team that analyzed welfare caseloads and costs, and projected budget requirements for future years.
- . State of Maryland. Surveyed operations of the State Road Department.
- . Federal Department of Transportation. Prepared a plan for full allocation of costs of rail passenger service between New York and Washington.

Prior to joining PMM&Co., Mr. McAloon worked in the Commercial Lending Department of the Bank of New York.

He earned his BA at the University of Pennsylvania and his MBA at Wharton Graduate School. He is a Certified Public Accountant in Pennsylvania.

As education costs soar, it becomes even more essential to hold down the costs of supporting functions. This author suggests a way of measuring their efficiency —

SCIENTIFIC TECHNIQUES FOR IMPROVING SCHOOL MANAGEMENT EFFECTIVENESS

by Harold I. Steinberg

Peat, Marwick, Mitchell & Co.

ONE of the few irrefutable statements about education is that its costs are going up, up, and up. While this axiom is particularly true of classroom activities, it applies to the supporting or noninstructional activities as well.

It is essential to get the most for the supporting function dollar—first, in order to have more money available for the educational program and, secondly, in order to lessen the chances of a taxpayer's revolt. Fortunately, the availability of scientific management techniques now gives the school administrator a way to determine whether he is furnishing this support effectively and economically.

The New York State Education Department, through the division of educational management services, recognizes the value of these new techniques. It has recently used operations research (the application of mathematics to solve business problems) to develop a measure of the effectiveness of one of the more expensive supporting activities—pupil transportation.

A two-page questionnaire was mailed to approximately 500 school districts in New York State. This questionnaire asked for data per-

taining to such factors as the area of the district, the number of miles of paved and unpaved roads, the topography of the district, the number of students transported, the scheduled starting time of various grades, the number of vehicles by capacity, and so on.

When the questionnaires were returned, the data were transcribed onto punch cards and entered into a high-speed computer. Using the technique* of multiple linear regres-

*The multiple linear regression technique was applied with the aid of a computer program entitled BMDO2R. This program was developed at the Health Sciences Computing Facility, Department of Preventive Medicine and Public Health, School of Medicine, University of California at Los Angeles. It is usable on IBM 7090/94 equipment. Application of this program to the raw data results in the production of coefficients for each of the factors that were pre-identified as probably relevant to transportation activities. These coefficients form the basis of the formulas.

The technique can be achieved by a person possessing a mathematical background who is willing to apply himself to the solution of this problem. A good text for explaining the solution is *Introduction to Multi-Variate Statistical Analysis* by T. W. Henderson, John Wiley and Sons, New York, 1966.

sion, five mathematical formulas were developed for evaluating the management effectiveness of pupil transportation activities. A sixth formula was also produced for evaluating cost control and/or indicating the budgetary impact of a change in transportation policies. These formulas are shown in Exhibit 1 on page 53.

Measure of efficiency

The purpose of the formulas is to enable districts to compare themselves to other districts in spite of differences that would ordinarily defy comparison. Looking at this another way, if all school districts were exactly alike in the number of students transported, area of the district, miles of road, etc. and were operated with equal efficiency, the chances are that the number of buses and seats provided, the number of miles and hours the buses were run, and the cost of furnishing transportation would be fairly similar for all districts. In other words, one district's costs differ from another's because of environmental elements that a district superintendent cannot control, but costs also are affected by



the degree of efficiency with which the transportation activities are managed. This he can control. By means of the new scientific techniques, factors can be developed and applied to negate the effects of the environmental elements so that each district can then compare the efficiency of its operations to that of other districts or to the statewide average.

It is intended that a superintendent will use all the formulas together in order to evaluate the overall effectiveness of the transportation operation. An example of how he would use them and analyze the results has been randomly selected and is presented here.

Example

Assume that a district has accumulated the following data:

Number of students transported	2,819
Number of assigned buses	35
Number of assigned seats	1,861
Miles per year	378,000
Hours per year	25,200
Flat terrain	10%
Moderately hilly terrain	80%
Very hilly terrain	10%
Area of school district	76
Paved roads	200
Unpaved roads	10
Actual costs	\$199,688

The superintendent would substitute the values into the formulas and calculate the results. The figures provided by the formulas and the actual results would then be compared as shown in Exhibit 2 on the opposite page.

In this situation, most of the formula estimates are very close to the actual data. However, both cost formulas show approximately the same amount of overexpenditure. It cannot be attributed to too many buses or seats or too many miles or hours driven. Therefore a cost control problem probably exists. The superintendent would be well

advised to examine the wage structure and possibly other personnel factors that contribute to cost.

Other applications of the formula have revealed the ownership of more buses than necessary and excessively high prices proposed by contract bus operators.

Naturally, the formulas illustrated here apply to only New York State's pupil transportation activities. Also, field testing has revealed that slightly different formulas are appropriate for those districts in which the number of pupils per square mile requiring transportation is unusually high. Formulas can be developed with equal ease for other states, however. The present formulas lose reliability as time passes, of course, but they can be updated simply by gathering and analyzing the latest data available.

Applications of the multiple linear regression technique and mathematical formulas for evaluating management effectiveness need not be limited to transportation. The study that produced these formulas also indicated that the same technique could be applied to such problems as the number of clerical and secretarial personnel, the school lunch program, custodial services and supplies, and the attendance function.

In short, the recent and rapid evolution of scientific management provides the school administrator with a powerful new tool for increasing his management effectiveness.



HAROLD I. STEINBERG, CPA, is a manager in the New York office of Peot, Marwick, Mitchell & Co. Formerly he was with Anchin, Black & Anchin. A graduate of Syracuse University, he received his MBA degree from New York University. Mr. Steinberg has contributed articles on management, accounting, and systems to various accounting and educational publications and has served as a member of the seminar staff of the National Association of Independent Schools, teaching long-range financial planning.

Applications . . . need not be limited to transportation . . .

The same technique could be applied to such problems as the number of clerical personnel, the school lunch program, custodial services and supplies, and the school attendance function.

EXHIBIT 1

Formulas

$$\begin{aligned}
 &1. \text{ Total Transportation Cost} = \frac{\text{Number of Students Transported}}{\text{Number of Students Transported}} \times \left[61.49 + 21.28 \times \frac{\text{Miles of Unpaved Roads}}{(\text{Miles of Paved} + \text{Unpaved Roads})} - .068 \right. \\
 &\quad \times \frac{\text{Number of Students Transported}}{\text{Area of school District}} + .053 \times \text{Terrain Factor} - .003 \times \left. \frac{(\text{Miles of Paved} + \text{Unpaved Roads})}{\text{Miles of Paved} + \text{Unpaved Roads}} \right] \\
 &2. \text{ Number of Buses} = \frac{\text{Number of Students Transported}}{\text{Number of Students Transported}} \times \left[.011 + .0077 \times \frac{\text{Miles of Unpaved Roads}}{(\text{Miles of Paved} + \text{Unpaved Roads})} - .00002 \right. \\
 &\quad \times \frac{\text{Number of Students Transported}}{\text{Area of School District}} + .00002 \times \text{Terrain Factor} \left. \right] \\
 &3. \text{ Number of Seats} = \frac{\text{Number of Students Transported}}{\text{Number of Students Transported}} \times \left[.609 + .235 \times \frac{\text{Miles of Unpaved Roads}}{(\text{Miles of Paved} + \text{Unpaved Roads})} - .0008 \right. \\
 &\quad \times \frac{\text{Number of Students Transported}}{\text{Area of School District}} + .001 \times \text{Terrain Factor} - .00004 \times \left. \frac{\text{Miles of Paved} + \text{Unpaved Roads}}{\text{Miles of Paved} + \text{Unpaved Roads}} \right] \\
 &4. \text{ Total Miles per Year} = \frac{\text{Number of Students Transported}}{\text{Number of Students Transported}} \times \left[152.01 - 17.35 \times \frac{\text{Miles of Unpaved Roads}}{(\text{Miles of Paved} + \text{Unpaved Roads})} - .229 \right. \\
 &\quad \times \frac{\text{Number of Students Transported}}{\text{Area of School District}} + .164 \times \text{Terrain Factor} + .029 \times \left. \frac{\text{Miles of Paved} + \text{Unpaved Roads}}{\text{Miles of Paved} + \text{Unpaved Roads}} \right] \\
 &5. \text{ Total Hours per Year} = \frac{\text{Number of Students Transported}}{\text{Number of Students Transported}} \times \left[9.835 - 6.89 \times \frac{\text{Miles of Unpaved Roads}}{(\text{Miles of Paved} + \text{Unpaved Roads})} - .014 \right. \\
 &\quad \times \frac{\text{Number of Students Transported}}{\text{Area of School District}} + .0348 \times \text{Terrain Factor} - .0002 \times \left. \frac{(\text{Miles of Paved} + \text{Unpaved Roads})}{\text{Miles of Paved} + \text{Unpaved Roads}} \right] \\
 &6. \text{ Total Transportation Cost (Budgetary Impact)} = \frac{\text{Number of Assigned Buses}}{\text{Number of Assigned Buses}} \times \left[- 623.00 + 103.20 \times \frac{\text{Average Number of Seats per Assigned Bus}}{\text{Average Number of Seats per Assigned Bus}} + .038 \times \frac{\text{Average Yearly Miles per Assigned Bus}}{\text{Average Yearly Miles per Assigned Bus}} \right]
 \end{aligned}$$

EXHIBIT 2

Efficiency Evaluation

	By formula	Actual	Difference
Cost — for measuring effectiveness	\$182,276	199,688	+17,412
Buses (assigned)	36	35	-1
Seats (assigned)	1,922	1,861	-61
Miles (assigned)	3,161	3,161	0
Seats (assigned)	1,922	1,861	-61
Miles	465,641	378,000	-87,641

